

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled)
2. (Currently Amended) The method of Claim 450, ~~further comprising an initial step of providing wherein the performing is via a wireless communication sub-network incorporating the link.~~
3. (Canceled)
4. (Currently Amended) The method of Claim 350, wherein the link ~~further comprises a link is between a~~ the mobile device and a home agent.
5. (Currently Amended) The method of Claim [[4]] 50, wherein the current round trip estimation process further comprises ~~at least one of an echo subprocess or a packet subprocess running concurrently with the re-registration subprocess~~.
6. (Currently Amended) The method of Claim 550, wherein the start time further comprises a send time of ~~a~~ the re-registration request.
7. (Currently Amended) The method of Claim 550, wherein the end time further comprises a receipt time of a re-registration reply.
8. (Currently Amended) ~~A~~ The method for determination of link latency in a Mobile IP network of Claim 50, the method comprising steps of:
  - (a) determining an unloaded network delay according to an initial registration process;

(b) ~~setting a current estimated delay equal to the unloaded network delay;~~  
(c) ~~upon commencement of a re registration attempt, noting a send time of a current round trip estimation process;~~  
(d) ~~setting a retry timer equal to the sum of a predetermined backoff period and the current estimated network delay;~~  
(e) ~~and if the retry timer expires before receipt of a re registration reply, updating the predetermined backoff period and repeating steps (d) and (e);~~  
(f) and wherein the resetting further comprises noting a receipt time of a re registration reply if the retry timer does not expire before the receipt time of the re registration reply, noting the receipt time of the current round trip estimation process and resetting the current estimated delay equal to the difference between the receipt time and the send time.

9. (Currently Amended) The method of Claim 850, wherein the initial registration process further comprises the steps of:

noting a send time of an initial registration request from the mobile device to the a home agent;

noting a receipt time of a registration reply corresponding to the initial registration request from the home agent to the mobile device; and

determining the unloaded network delay according to the formula:

$$RTT(0) = (RRP(initial) - RRQ(initial)),$$

wherein  $RTT(0)$  represents the an initial registration round trip delay,  $RRP(initial)$  represents the receipt time of the initial registration reply sent by the HA, and  $RRQ(initial)$  represents the send time of the initial registration request.

10. (Currently Amended) The method of Claim 850, wherein the current round trip estimation process further comprises a re-registration subprocess.

11. (Currently Amended) The method of Claim 910, wherein the re-registration subprocess further comprises steps of:

noting the send time of an RRQ for re-registration;

noting the receipt time of a corresponding RRP; and  
determining the current estimated round trip delay according to the formula:

$$RTT(\text{current}) = RRP(x\_t) - RRQ(x\_t),$$

wherein  $RTT(\text{current})$  represents the current estimated round trip delay,  $RRP(x\_t)$  represents the receipt time of the RRP associated with the current re-registration attempt, and  $RRQ(x\_t)$  represents the send time of the RRQ associated with the current re-registration.

12. (Currently Amended) The method of Claim 850, wherein the current round trip estimation process further comprises an echo subprocess.

13. (Currently Amended) The method of Claim 12, wherein the echo subprocess further comprises ~~the steps of~~:

noting a send time of an ICMP echo request from the mobile device to ~~the~~an agent device;

noting ~~the~~a receipt time of a corresponding ICMP echo from the agent device to the mobile device; and

determining the current estimated network delay according to the formula:

$$RTT(\text{current}) = (ECHO(\text{receive}) - ECHO(\text{send})),$$

wherein  $RTT(0)$  represents the current estimated round trip delay,  $ECHO(\text{receive})$  represents the receipt time of the corresponding ICMP echo received from the ~~home~~-agent device, and  $ECHO(\text{send})$  represents the send time of the ICMP echo request.

14. (Currently Amended) The method of Claim 850, wherein the current round trip estimation process further comprises a packet correlationsubprocess.

15. (Currently Amended) The method of Claim 14, wherein the packet correlationsubprocess further comprises ~~the steps of~~:

noting ~~the~~a send time of a TCP packet sent from the mobile device to ~~the~~a home agent;

noting ~~the~~a receipt time of a corresponding acknowledgment sent from the home agent to the mobile device; and

Application No. 10/681,883  
Amendment dated June 19, 2009  
Reply to Office Action of March 20, 2009

determining the current estimated network delay according to the formula:

$$RTT(\text{current}) = (\text{ACK}(\text{receipt}) - \text{PACKET}(\text{send})),$$

wherein  $RTT(\text{current})$  represents the current estimated round trip delay,  $\text{ACK}(\text{receipt})$  represents the receipt time of the acknowledgment, and  $\text{PACKET}(\text{send})$  represents the send time of the TCP packet.

16. - 28. (Canceled)

29. (Currently Amended) The ~~system~~-mobile device of Claim 2852, wherein during the initial registration process the unloaded delay module determines the re-registration process further comprises:

~~noting a send time of a re-registration request from the mobile device to the home agent;~~  
~~noting a receipt time of a re-registration reply corresponding to the initial registration request from the home agent to the mobile device; and~~

determining the unloaded network delay according to the formula:

$$RTT(\text{current}) = (\text{RRP}(x\_t) - \text{RRQ}(x\_t)),$$

wherein  $RTT(\text{current})$  represents the current estimated round trip delay,  $\text{RRP}(x\_t)$  represents ~~the a~~ receipt time of the RRP associated with the current re-registration attempt, and  $\text{RRQ}(x\_t)$  represents ~~the a~~ send time of the RRQ associated with the current re-registration.

30. (Currently Amended) The ~~mobile device~~system of Claim 2855, wherein during the echo subprocess the unloaded delay module determines further comprises:

~~noting a send time of an ICMP echo request from the mobile device to the agent device;~~  
~~noting the receipt time of a corresponding ICMP echo from the agent device to the mobile device; and~~

determining the loaded network delay according to the formula:

$$RTT(t) = (\text{ECHO}(\text{receive}) - \text{ECHO}(\text{send})),$$

wherein  $RTT(\text{current})$  represents the current estimated round trip delay,  $\text{ECHO}(\text{receive})$  represents ~~the a~~ receipt time of the ~~corresponding~~ an ICMP echo received from ~~the home~~ an

agent device, and *ECHO(send)* represents the a send time of the a corresponding ICMP echo request transmitted to the agent device.

31. (Currently Amended) The system mobile of Claim 2855, wherein during the packet subprocess the unloaded delay module determines current round trip estimation process further comprises:

noting the send time of a TCP packet sent from the mobile device to the home agent; noting the receipt time of a corresponding acknowledgment sent from the home agent to the mobile device; and

determining the loaded network delay according to the formula:

$$RTT(t) = (ACK(receipt) - PACKET(send)),$$

wherein *RTT(0)* represents the current estimated round trip delay, *ACK(receipt)* represents the a receipt time of the an acknowledgment from an agent device, and *PACKET(send)* represents the a send time of transmitting at the TCP packet to the agent device.

32. - 49. (Canceled)

50. (New) A method of optimizing a timing of re-registration of a mobile device with a wireless network, comprising:

performing, via a link, an initial registration process with a wireless network to generate a current registration;

determining an unloaded network delay for round trip traversal of the link corresponding to the initial registration process, wherein the round trip traversal of the link occurs without concurrent in-band data;

setting a current estimated delay equal to the unloaded network delay;

performing a re-registration process during a duration of the current registration, including:

transmitting a re-registration request to the wireless network;

initiating a current round trip estimation process during the re-registration process, wherein the current round trip estimation process has a start time and an end time

defining a current round trip traversal, wherein the current round trip traversal occurs with concurrent in-band data;

setting a retry timer equal to the sum of a predetermined backoff period and the current estimated network delay;

if the retry timer expires before the end time of the current round trip estimation process, increasing the predetermined backoff period and repeating the transmitting of the re-registration request and the initiating of the current round trip estimation process; and

resetting, at an end of the re-registration procedure, the current estimated delay equal to a difference between the end time of the current round trip estimation process and the start time of the current round trip estimation process.

51. (New) A mobile device with optimized re-registration timing, comprising:
  - means for performing, via a link, an initial registration process with a wireless network to generate a current registration;
  - means for determining an unloaded network delay for round trip traversal of the link corresponding to the initial registration process, wherein the round trip traversal of the link occurs without concurrent in-band data;
  - means for setting a current estimated delay equal to the unloaded network delay;
  - means for performing a re-registration process during a duration of the current registration, including:
    - means for transmitting a re-registration request to the wireless network;
    - means for initiating a current round trip estimation process during the re-registration process, wherein the current round trip estimation process has a start time and an end time defining a current round trip traversal, wherein the current round trip traversal occurs with concurrent in-band data;
    - means for setting a retry timer equal to the sum of a predetermined backoff period and the current estimated network delay;
    - if the retry timer expires before the end time of the current round trip estimation process, means for increasing the predetermined backoff period and repeating the transmitting of the re-registration request and the initiating of the current round trip estimation process; and

means for resetting, at an end of the re-registration procedure, the current estimated delay equal to a difference between the end time of the current round trip estimation process and the start time of the current round trip estimation process.

52. (New) A mobile device with optimized re-registration timing, comprising:
- an unloaded delay module for determining an unloaded network delay for round trip traversal of a link with the wireless network corresponding to an initial registration process of the mobile device to generate a current registration, wherein the round trip traversal of the link occurs without concurrent in-band data;
  - a current estimated delay module for setting a current estimated delay equal to the unloaded network delay;
  - a request send time module for noting a start time of a current round trip estimation process defining a current round trip traversal, wherein the current round trip estimation process corresponds to a re-registration process during a duration of the current registration and includes transmitting a re-registration request to the wireless network, wherein the current round trip traversal occurs with concurrent in-band data;
  - a retry timer module for setting a retry timer equal to the sum of a predetermined backoff period and the current estimated network delay upon commencement of the current round trip estimation process;
  - a timer expiration module for increasing the predetermined backoff period and causing a re-transmitting of the re-registration request and a re-initiating of the current round trip estimation process if the retry timer expires before an end time of the current round trip estimation process; and
  - a reset module for resetting, at an end of the re-registration procedure, the current estimated delay equal to a difference between the end time of the current round trip estimation process and the start time of the current round trip estimation process.

53. (New) The mobile device of Claim 52, wherein the link corresponds to a wireless communication sub-network.

54. (New) The mobile device of Claim 52, wherein the link is between the mobile device and a home agent.

55. (New) The mobile device of Claim 52, wherein the current round trip estimation process further comprises at least one of an echo subprocess or a packet subprocess running concurrently with the re-registration process.

56. (New) The mobile device of Claim 52, wherein the start time further comprises a send time of the re-registration request.

57. (New) The mobile device of Claim 52, wherein the end time further comprises a receipt time of a re-registration reply.

58. (New) The mobile device of Claim 52, wherein the reset module further notes a receipt time of a re-registration reply if the retry timer does not expire before the receipt time, and resets the current estimated delay equal to the difference between the receipt time and the send time.

59. (New) The mobile device of Claim 52, wherein during the initial registration process the unloaded delay module determines the unloaded network delay according to the formula:

$$RTT(0) = (RRP(initial) - RRQ(initial)),$$

wherein  $RTT(0)$  represents an initial registration round trip delay,  $RRP(initial)$  represents a receipt time of an initial registration reply sent by a home agent, and  $RRQ(initial)$  represents a send time of an initial registration request transmitted to the home agent by the mobile device.